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Effect of Anti-Microtubular Agents on Respiration and Ultrastructural Organization of Wheat Leaf Cells

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Abstract

The effect of anti-microtubular agents oryzalin (15 μM) and colchicine (1 mM) on respiration and fine cellular organization of leaves was studied in wheat (Triticum aestivum L.) seedlings. Unlike oryzalin, colchicine considerably suppressed total respiration and the activities of cytochrome and cyanide-resistant pathways of electron transport, probably due to its rotenone-like effect since the latter was negated by vicasol that shunts the first complex of respiratory chain. Oryzalin-induced changes in the ultrastructure of mitochondria and polysomes corresponding to a decrease in their functional activity were detected. The changes in the shape of mitochondria were observed in the companion cells, whereas the mesophyll organelles did not respond to oryzalin. Disintegration of polysomes induced by oryzalin was detected in the cells of both tissues. Association of microtubules with mitochondria, polysomes, and plasma membrane was detected in situ. These data suggest that the intact cytoskeleton may participate in the spatial organization of energy transformation and protein synthesis machinery of the cells; the fact that the observed changes were tissue-specific points at the functional role of microtubules and/or to the number of targets for the inhibitor.

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Keywords

Anti-microtubular agents, Mitochondria, Polysomes, Respiration, Triticum aestivum